

TECHNICAL FEASIBILITY OF REGIONAL DEEP HYPERTHERMIA FOR MALIGNANT LIVER TUMORS IN CHILDREN AND ADOLESCENTS

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Objectives

The aim of this study was to investigate the feasibility of intravenous platinum-based chemotherapy and regional deep hyperthermia treatment in children and adolescents with hepatic neoplasms.

Materials and Methods

Between May 1993 and March 2001 five children and adolescents with malignant liver tumors received intravenous platinum-based chemotherapy and regional deep hyperthermia as second line treatment. At the time of relapse therapy patients were aged between 02;01 and 16;08 years (median 04;08 years). Four patients were female, one was male. Two patients suffered from primary hepatic malignancies (1 hepatocellular carcinoma, 1 bile duct rhabdomyosarcoma), 3 patients had hepatic metastases (1 granulosa cell tumour, 2 yolk sac tumors). Liver hyperthermia was administered using BSD-2000 annular phased array systems (Sigma-30 and Sigma-40). All patients received intravenous sedation using pethidine, promethazine, dehydrobenzperidole and midazolam during RHT treatment. Liver temperatures were monitored by nonpertubing intratumoral catheters and bowman probes. Additional probes were placed in bladder, rectum, vagina as well as on ventral and dorsal chest wall. Liver hyperthermia was combined with different combinations of anticancer drugs (CEC = carboplatin/etoposide/ cyclophosphamide, PEI = cisplatin/etoposide/ifosfamide, EI = etoposide/ ifosfamide, PFA = cisplatin/5-fluorouracil/adriamycin, CE = carboplatin/ etoposide). To examine hepatic toxicity AST, ALT, AP, gGT and CHE were measured daily.

Results

In these five patients 6 to 14 heat sessions were performed (median 10 sessions). RHT was administered at frequencies between 95 and 135 MHz (median 110 MHz). Power supply ranged between 7.5 and 30.1 W/kg body weight (median 15.6 W/kg). Maximum tumor temperature reached 42.2 °C to 44.6 °C (median 43.0 °C). Superficial skin, vaginal, rectal and vesical thermometry showed non-toxic temperatures ≤ 42.1 °C. Under intravenous chemotherapy and heat treatment a transitory increase of liver enzymes was observed. AST and ALT peaked during first course of RHT to maximum values of 199 U/L and 165 U/L, respectively. No further complications occurred during the observation period.

Conclusion

Salvage therapy with intravenous platinum-based chemotherapy and regional deep hyperthermia was well tolerated in children and adolescents with hepatic neoplasms. Larger studies are needed to investigate beneficial effects on patient outcome.

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